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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	Ruppert et al.
SERIAL NO.:	09/781,795
FILED:	February 12, 2001
ART UNIT:	3618
EXAMINER:	Vanaman, Frank Bennett
FOR:	LOW FLOOR DRIVE UNIT ASSEMBLY FOR AN ELECTRICALLY DRIVEN VEHICLE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Appellant submits this Appeal Brief pursuant to the Notice of Appeal filed January 4, 2005. Fees for the Appeal Brief were paid with the filing of the first Appeal Brief on January 22, 2004. Applicant believes that no additional fees are necessary, however, the Commissioner is authorized to charge Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds for any additional fees or credit the account for any overpayment.

REAL PARTY IN INTEREST

The real party in interest is Meritor Heavy Vehicle Systems, LLC, the assignee of the entire right and interest in this Application.

RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences or judicial proceedings related to this appeal, or which may directly affect or may be directly affected by, or have a bearing on, the Board's decision in this appeal.

STATUS OF CLAIMS

Claims 23-31, 33-41, 43-46, 48-55, and 57-58 remain in the application including independent claims 23, 28, 29, 37, 40, 41, 48, 51, and 57. Claims 32, 42, 47, and 56 have been cancelled. Claims 28-31, 33-35, 37, 40-41, 43-46, 48-55, and 57-58 are allowed. Claims 23-27, 36, 38, and 39 are the only rejected claims.

Thus, claims 23-27, 36, 38, and 39 are pending, rejected, and appealed including independent claim 23.

STATUS OF AMENDMENTS

All amendments have been entered.

SUMMARY OF CLAIMED SUBJECT MATTER

Applicant's invention relates to a unique electric drive arrangement for vehicle wheels that improves passenger access to the vehicle. Mass transit vehicles, such as a buses or trolley cars, typically have seats aligned at the lateral sides of the vehicle, with a central aisle extending along the vehicle. The seats are typically at a higher vertical location than the aisle and the vehicle floor is typically raised above the wheels and other driveline components to avoid any

interference therewith. In order to facilitate entry and exit into the vehicle it is important to have the aisle and vehicle floor positioned as low to the ground as possible. This provides increased passenger space within the body of the vehicle and provides the option of reducing the overall height of the mass transit vehicle. Another advantage to having a lower floor position is improved handicapped access. Page 1, lines 8-15.

Mass transit vehicles typically have several axles, which support and drive and/or steer the vehicle. If the axle is a driving axle, then electric motors can be used to generate torque to drive the wheels. In a typical configuration, a centrally located electric motor drives two opposed wheels at the sides of the vehicle by way of a conventional axle. Usually, transmissions or drive shafts extend from the central motor to the axle. In the prior art, these motor, transmission, and axle elements are directly located below the center of the vehicle. The vehicle floor is positioned above the axle and other components, resulting in the floor being relatively high. Page 1, lines 16-23.

Applicant's unique electric drive configuration is utilized in an automotive vehicle 10 includes a passenger compartment 12 defined by a roof 14, two side-walls 16, and a vehicle floor 18. A pair of wheels 19, 21 are driven by an automotive vehicle drive unit assembly 20, which has a first unit 22 and a second unit 23. The first unit and second units 22 and 23 define an axis of rotation 26. The first unit 22 includes a first driving axle shaft 24 used to drive a first wheel hub 28, which revolves about the axis 26 of the first driving axle shaft 24. A first gear set 30, located adjacent to the first wheel 19, is comprised of a pinion gear 32 and a ring gear 34 that together drive the first wheel hub 28. Page 3, line 18 through Page 4, line 5.

A first electric motor 36, defining a motor axis of rotation 38, is mounted at a non-parallel angle relative to the axis of rotation 26 of the first driving axle shaft 24. The first electric motor 36 is shown mounted in a horizontal position such that the motor axis of rotation 38 is parallel to the vehicle floor 18 and is perpendicular to the axis of rotation 26 of the first driving axle shaft 24. Page 4, lines 5-9.

The second unit 23 includes a second driving axle shaft 24, a second wheel hub 28, a second gear set 30, and a second electric motor 36. The second unit 23 is a mirror image of the first unit 22 and operates in a similar manner. A beam 58 provides a fixed support and includes a housing that extends between the first 22 and second 23 units. Page 4, lines 10-14.

The first and second electric motors 36 can be mounted in various different positions relative to each other including being mounted in a generally horizontal position with both electric motors 36 extending forwardly from the beam 58, being mounted such that the electric motors 36 both extend rearwardly from the beam 58, or being mounted such that the first electric motor 36 extends in a forwardly direction relative to beam 58 while the second electric motor 36 extends in a rearwardly direction relative to beam 58. Arranging the configuration so that one electric motor 36 extends forwardly while the other electric motor 36 extends rearwardly can resolve electric motor weight balance issues that arise when both motors extend in the same direction from the beam 58. Page 4, line 14 through Page 5, line 2.

In order to achieve a more compact configuration, the first unit 22 can include a third electric motor 56, in parallel driving relationship with the first electric motor 36 to drive the first gear set 30. In this configuration the second unit 23 is a mirror image of the first unit 22, and includes a fourth electric motor 56, in parallel driving relationship with the second electric motor

36 to drive the second gear set 30. The use of a third 56 and fourth electric motor 56, where packaging space is available, allows smaller gears and motors to be used, thus reducing the necessary size for the system. Page 7, lines 1-8.

The first and second gear sets 30 are housed within gear-boxes 40 that are rigidly connected to the respective motors 36. A planetary gear set 46 can be used to achieve greater overall gear reduction. The planetary gear set 46 can either be located adjacent to the wheel hub 28 (Figure 4) or can be incorporated into the gear-box 40 (Figure 8). The planetary gear set 46 includes a sun gear 48, planet gears 50, and a ring gear hub 52. The planet gear assembly is inserted into the ring gear hub 52 such that the teeth of the planet gears 50 mesh with the teeth of the ring gear hub 52. Page 5, lines 3-19.

Incorporating the planetary gear set 46 into the gear-box 40 is a unique location for the planetary gear set 46. Typically, this location has been used by a differential, which includes a ring gear and a pinion gear that drive axle shafts. With independent electric motors 36 there is no need for a differential or for any direct mechanical link between opposing wheels. By incorporating the planetary gear set 46 into the gear box 40, the need for a planetary hub 54 is eliminated which decreases the vehicle weight, gives a broader selection of wheel equipment and wheel end features, and reduces overall cost. Page 6, lines 7-15.

By mounting the motors at the sides of the vehicle, the center of the vehicle floor may be lowered significantly than compared to the prior art. In addition, since the motors themselves are connected to drive the wheels at a non-parallel angle, they do not extend towards the center of the vehicle from the wheel for any undue amount. Thus, the lower floor can begin at a laterally outer position. Page 7, lines 10-14.

Independent claim 23 recites an automotive vehicle drive unit assembly that includes first and second driving axle shafts being co-linear and defining a lateral axis of rotation; first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation; a first gear set for driving said first wheel hub; a second gear set for driving said second wheel hub; a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that intersects said lateral axis of rotation; a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that intersects said lateral axis of rotation and is spaced apart from said first longitudinal axis of rotation; and first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation. This configuration is best shown in Figures 4 and 8 and is described in the accompanying specification at Page 5, line 9 through Page 6, line 15.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

(1) Claims 23, 24, 26, 27, 36, and 39 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Anglada (US 1543044) in view of Varela (US 5435793).

(2) Claims 23-27, 36, and 38 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Anglada (US 1540526) in view of Varela (US 5435793).

ARGUMENT

(1) Obviousness Rejection of Anglada (US 1543044) As Modified by Varela

The Examiner has rejected claims 23, 24, 26, 27, 36, and 39 as being unpatentable over Anglada '044 in view of Varela.

Claim 23

Claim 23 recites the combination of a first electric motor that drives a first gear set and defines a first longitudinal axis of rotation that intersects a lateral axis of rotation, a second electric motor that drives a second gear set and defines a second longitudinal axis of rotation that intersects the lateral axis of rotation, and first and second planetary gear sets that are driven by the first and second gear sets about the lateral axis of rotation.

Anglada '044 discloses motors 15 that drive wheels 14 that rotate about a wheel axle 18. The motors 15 include motor shafts 17 that are coupled to an intermediate shaft 21 with a coupling 22, 23, 26. Each intermediate shaft 21 drives a first gear 20, which meshes with a second gear 19 that is secured to the wheel axle 18.

Varela discloses an axle housing 60 enclosing an axle shaft 50, which drives a sun gear 70. The sun gear 70 is in meshing engagement with a plurality of planet gears 80 that are supported on planet shafts 81. The planet shafts 81 are fixed to planet spider 100, which drives an output shaft 101. The planet gears 80 are also in meshing engagement with a ring gear 90 that is fixed to the axle housing 60.

A wet disc brake assembly 130 is positioned laterally between an end portion 61 of the axle housing 60 and the ring gear 90. The wet disc brake assembly 130 includes a brake housing 131 that is fastened to both the axle housing 60 and the ring gear 90 with fasteners 140.

A wheel bearing cage 120 is fastened to an opposite side of the ring gear 90 from the brake housing 131. The wheel bearing cage 120 supports wheel bearings 121 that allow the output shaft 101 to rotate relative to the axle housing 60, brake housing 131, ring gear 90, and wheel bearing cage 120. A wheel mounting flange 110 is mounted to an end of the output shaft 101 and a wheel (not shown) is mounted to the wheel mounting flange 110.

The examiner admits that Anglada fails to teach first and second planetary gear sets located in the respective wheel hubs, and relies on Varela for teaching this feature. The examiner argues that it would be obvious to provide Anglada '044 with a planetary reduction gearing as taught by Varela, "the sun gear being driven from the shaft taught by Anglada which is in turn connected to the ring gear (19), for the purpose of allowing a high speed motor to be used and generate a desired quantity of torque." Appellant disagrees.

There is no motivation or suggestion to modify Anglada in the manner described by the examiner. A reference cannot be modified with teachings from the prior art absent some sort of beneficial result for the reference. Also, a base reference cannot be modified if the modification adversely affects the benefits achieved by the base reference.

One of the main benefits provided by Anglada '044 is a flexible drive configuration from the motors to the wheels that permits a wide range of movement of the rear axle and the housing with respect to the frame and motor. See Page 1, column 1, lines 14-25. Anglada achieves this by configuring a motor shaft, intermediate shaft, wheel shaft, and coupling arrangement that

provides the desired lateral and vertical movement from the motor to the wheel. To modify Anglada in the manner proposed by the examiner would require a significant reconfiguration of the drive components and would introduce further rigidity (ring gear hub, planetary spider, sun gear, planet gears, planet shafts, etc) into the system that would affect the ability of the drive configuration to flex and move as desired.

Thus, appellant asserts that there is no motivation or suggestion to modify Anglada in the manner proposed by the examiner and that the examiner has not provided a sufficient prima facie case to support an obviousness rejection. The examiner has not provided sufficient motivation or suggestion other than a generalized assertion that the modification would provide a desired quantity of torque. The examiner has pointed to no teaching in Varela of any particular benefit to using the Varela planetary gear arrangement in the Anglada drive configuration. In addition, there is nothing in Anglada that would have led one of ordinary skill in the art to believe that Anglada's drive configuration was in any way deficient for Anglada's purposes or was in need of modification, especially as the Anglada final drive was specifically designed to achieve a beneficial, flexible drive configuration. One of ordinary skill in the art would have found no reason, suggestion, or incentive for attempting to combine these references so as to arrive at the subject matter of claim 23 other than through the luxury of hindsight accorded one who first viewed appellant's disclosure.

Further, even if properly combined, the references do not disclose, suggest, or teach the claimed configuration. Varela discloses a very different drive configuration than that set forth in claim 23. Varela discloses an axle shaft 50 that drives a sun gear 70, which is in meshing

engagement with a plurality of planet gears 80 that drive planet shafts 81 fixed to planet spider 100, where the planet spider 100 drives the output shaft 101, which in turn drives the wheel.

Thus, Varela discloses driving a planetary gear set with an axle shaft and then uses the planetary gear set to drive a wheel output shaft where a wheel is mounted to the wheel output shaft. There is no such configuration set forth in Anglada that could accommodate the configuration disclosed by Varela in the manner proposed by the examiner. Further, the examiner has not pointed to any specific disclosures in either reference indicating how and/or where a planetary gear configuration would be incorporated into the final drive of Anglada. This appears to be a clear case of hindsight reconstruction of the claimed invention, using appellant's structure as a template and selecting elements from the references to fill the gaps.

Thus, appellant asserts that the rejection of claim 23 under 35 U.S.C. 103(a) based on Anglada '044 as modified by Varela is improper and requests that the rejection be withdrawn.

Claim 24

Claim 24 recites that the first and second planetary gear sets are incorporated into the first and second wheel hubs. Again the examiner admits that Anglada '044 does not disclose this feature. Varela, also, clearly does not disclose, suggest, or teach this feature. In fact, Varela teaches away from the proposed modification.

One problem identified in Varela concerned a planetary gear set and wet disc brake combination having an external diameter limited by the wheel hub. This limitation resulted in planetary gears having large gear widths, and the wet disc brake requiring a large number of brake discs, both of which were undesirable. See column 2, lines 5-8. Varela solved this

problem by moving the planetary gear set and the wet disc brake away from the wheel hub such that these components were no longer limited by the wheel pilot of the wheel hub. See column 3, lines 62-64.

As shown in Figure 5, the planetary gear set is clearly positioned at an inboard location, away from the wheel hub 110 and close to the end of the axle housing 60. This allows the external diameter of the planetary ring gear 90 and the brake housing 131 to be as large as needed because there is no interference with wheel hub 110, which provides the beneficial structure desired by Varela. Thus, Varela teaches away from the configuration that the examiner seeks to achieve by modifying Anglada with Varela. Thus, appellant asserts that there is no motivation or suggestion to modify Anglada with Varela.

Even if properly combined, the references do not teach the claimed invention. The examiner has argued that Varela teaches incorporating a planetary gear set into a gear hub, referring to Figure 5. Specifically, the examiner argues that Varela teaches planetary gearing located "within a wheel hub assembly (110, 120, 131, etc)." Appellant disagrees with this interpretation of Varela.

The examiner is arguing that Varela discloses a combination of components 110, 120, 131, which together form the wheel hub assembly. This interpretation clearly contradicts the described configuration set forth in Figure 5 of Varela. While it is well settled that the terms in a claim are to be given their broadest reasonable interpretation, this interpretation must be consistent with the specification, with claim language being read in light of the specification as it would be interpreted by one of ordinary skill in the art. In re Bond, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990). One of ordinary skill in the art simply would not consider the components 131

and 120 of Varela as corresponding to the claimed wheel hub, especially as Varela clearly describes these components as a brake housing 131 and a wheel bearing cage 120.

Further, the examiner for some reason has not included component 90, which is clearly shown as being positioned between the brake housing 131 and the wheel bearing cage 120, in the combined description of the wheel hub. This is because component 90 is the ring gear and definitely cannot be considered as corresponding to the claimed wheel hub.

Also, appellant's claimed wheel hub is a rotating component. This feature is clearly set forth in claim 23, which states: "first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation." The brake housing 131, ring gear 90, and wheel bearing cage 120 of Varela are all non-rotating components. Each of these components 131, 90, 120 is fastened to the axle housing 60 with fasteners 140. Thus, components 120 and 131 cannot be part of the wheel hub and one of ordinary skill in the art would never consider these components to be a wheel hub, contrary to the examiner's position set forth in the Advisory Action of January 6, 2005.

The only component that can remotely be considered to correspond to a wheel hub is the wheel mounting flange 110. The wheel mounting flange 110 is a rotating component that is fixed to an outboard end of the output shaft 101. As shown in Figure 5, the planetary gear set 70, 80, 90 is clearly not incorporated into the wheel mounting flange 110.

Thus, appellant asserts that the rejection of claim 24 under 35 U.S.C. 103(a) based on Anglada '044 as modified by Varela is improper and requests that the rejection be withdrawn.

Claim 27

Claim 27 recites that the first planetary gear set includes a first sun gear mounted for rotation with the first ring gear and the second planetary gear set includes a second sun gear mounted for rotation with the second ring gear.

None of the references disclose this configuration. Anglada discloses fixing a ring gear 19 directly to the wheel shaft 18. Varela discloses driving a sun gear 70 with an axle shaft 50 and driving a wheel output shaft 101 with the planet spider 100. There is no disclosure in either reference of a sun gear being mounted for rotation with a ring gear from the first gear set in the manner set forth in the claims.

Thus, appellant asserts that the rejection of claim 27 under 35 U.S.C. 103(a) based on Anglada '044 as modified by Varela is improper and requests that the rejection be withdrawn.

(2) Obviousness Rejection of Anglada (US 11540526) As Modified by Varela

The Examiner has rejected claims 23-27, 36, and 38 as being unpatentable over Anglada '526 in view of Varela.

Claim 23

Claim 23 recites the combination of a first electric motor that drives a first gear set and defines a first longitudinal axis of rotation that intersects a lateral axis of rotation, a second electric motor that drives a second gear set and defines a second longitudinal axis of rotation that intersects the lateral axis of rotation, and first and second planetary gear sets that are driven by the first and second gear sets about the lateral axis of rotation.

Anglada '526 discloses motors 15 that drive wheels 14 that rotate about a wheel axle 13. The motors 15 include motor shafts 19 that drive a first gear 20, which meshes with a second gear 21 that is secured to the wheel axle 13.

The examiner admits that Anglada '526 fails to teach first and second planetary gear sets located in the respective wheel hubs, and relies on Varela for teaching this feature. The examiner argues that it would be obvious to provide Anglada '526 with a planetary reduction gearing as taught by Varela, "the sun gear being driven from the shaft taught by Anglada '526 which is in turn connected to the ring gear (19), for the purpose of allowing a high speed motor to be used and generate a desired quantity of torque." Appellant disagrees.

There is no motivation or suggestion to modify Anglada in the manner described by the examiner. A reference cannot be modified with teachings from the prior art absent some sort of beneficial result for the reference. Also, a base reference cannot be modified if the modification adversely affects the benefits achieved by the base reference.

One of the main benefits provided by Anglada '526 is a flexible drive configuration from the motors to the wheels that permits desired movement of the motors, frame, and wheel axles. See Page 1, column 2, lines 68-81. Anglada achieves this by configuring a motor casing, axle housing, motor shaft, wheel shaft, and coupling arrangement that provides the desired relative movement between the motor and the axles, the motor and the vehicle frame, and between respective axle housings. To modify Anglada in the manner proposed by the examiner would require a significant reconfiguration of the drive components and would introduce further rigidity (ring gear hub, planetary spider, sun gear, planet gears, planet shafts, etc) into the system that would affect the ability of the drive configuration to flex and move as desired.

Additionally, Anglada '526 is configured to provide specific counterbalance configurations to address weight distribution between the motors and the axles. See Page 2, lines 35-42 and 61-69.

Thus, appellant asserts that there is no motivation or suggestion to modify Anglada '526 in the manner proposed by the examiner, and asserts that the examiner has not provided a sufficient prima facie case to support an obviousness rejection. The examiner has not provided sufficient motivation or suggestion other than a generalized assertion that the modification would provide a desired quantity of torque. The examiner has pointed to no teaching in Varela of any particular benefit to using the Varela planetary gear arrangement in the Anglada drive configuration. In addition, there is nothing in Anglada '526 that would have led one of ordinary skill in the art to believe that Anglada's drive configuration was in any way deficient for Anglada's purposes or was in need of modification, especially as the Anglada final drive was specifically designed to achieve a beneficial, balanced and flexible drive configuration. One of ordinary skill in the art would have found no reason, suggestion, or incentive for attempting to combine these references so as to arrive at the subject matter of claim 23 other than through the luxury of hindsight accorded one who first viewed appellant's disclosure.

Further, even if properly combined, the references do not disclose, suggest, or teach the claimed configuration. Varela discloses a very different drive configuration than that set forth in claim 23. Varela discloses an axle shaft 50 that drives a sun gear 70, which is in meshing engagement with a plurality of planet gears 80 that drive planet shafts 81 fixed to planet spider 100, where the planet spider 100 drives the output shaft 101, which in turn drives the wheel.

Thus, Varela discloses driving a planetary gear set with an axle shaft and then using the planetary gear set to drive a wheel output shaft, where a wheel is mounted to the wheel output shaft. There is no such configuration set forth in Anglada '526 that could accommodate the configuration disclosed by Varela in the manner proposed by the examiner. Further, the examiner has not pointed to any specific disclosures in either reference indicating how and/or where a planetary gear configuration would be incorporated into the final drive of Anglada '526. This appears to be a clear case of hindsight reconstruction of the claimed invention, using appellant's structure as a template and selecting elements from the references to fill the gaps.

Thus, appellant asserts that the rejection of claim 23 under 35 U.S.C. 103(a) based on Anglada '526 as modified by Varela is improper and requests that the rejection be withdrawn.

Claim 24

Claim 24 recites that the first and second planetary gear sets are incorporated into the first and second wheel hubs. Again the examiner admits that Anglada '526 does not disclose this feature. Varela, also, clearly does not disclose, suggest, or teach this feature. In fact, Varela teaches away from the proposed modification.

One problem identified in Varela concerned a planetary gear set and wet disc brake combination having an external diameter limited by the wheel hub. This limitation resulted in planetary gears having large gear widths, and the wet disc brake requiring a large number of brake discs, both of which were undesirable. See column 2, lines 5-8. Varela solved this problem by moving the planetary gear set and the wet disc brake away from the wheel hub such

that these components were no longer limited by the wheel pilot of the wheel hub. See column 3, lines 62-64.

As shown in Figure 5, the planetary gear set is clearly positioned at an inboard location, away from the wheel hub 110 and close to the end of the axle housing 60. This allows the external diameter of the planetary ring gear 90 and the brake housing 131 to be as large as needed because there is no interference with wheel hub 110, which provides the beneficial structure desired by Varela. Thus, Varela teaches away from the configuration that the examiner seeks to achieve by modifying Anglada with Varela. Thus, appellant asserts that there is no motivation or suggestion to modify Anglada with Varela.

Even if properly combined, the references do not teach the claimed invention. The examiner has argued that Varela teaches incorporating a planetary gear set into a gear hub, referring to Figure 5. Specifically, the examiner argues that Varela teaches planetary gearing located "within a wheel hub assembly (110, 120, 131, etc)." Appellant disagrees with this interpretation of Varela.

The examiner is arguing that Varela discloses a combination of components 110, 120, 131, which together form the wheel hub assembly. This interpretation clearly contradicts the described configuration set forth in Figure 5 of Varela. For the reasons set forth above in Section (1), one of ordinary skill in the art simply would not consider the components 131 and 120 of Varela as corresponding to the claimed wheel hub, especially as Varela clearly describes these components as a brake housing 131 and a wheel bearing cage 120.

Further, appellant's claimed wheel hubs are rotating components as defined in claim 23. The brake housing 131, ring gear 90, and wheel bearing cage 120 of Varela are all non-rotating

components. Thus, components 120 and 131 cannot be part of the wheel hub and one of ordinary skill in the art would never consider these components to be a wheel hub, contrary to the examiner's position set forth in the Advisory Action of January 6, 2005.

The only component that can remotely be considered to correspond to a wheel hub is the wheel mounting flange 110. The wheel mounting flange 110 is a rotating component that is fixed to an outboard end of the output shaft 101. As shown in Figure 5, the planetary gear set 70, 80, 90 is clearly not incorporated into the wheel mounting flange 110.

Thus, appellant asserts that the rejection of claim 24 under 35 U.S.C. 103(a) based on Anglada '526 as modified by Varela is improper and requests that the rejection be withdrawn.

Claim 25

Claim 25 recites a first gearbox for housing the first gear set and a second gearbox for housing the second gear set where the first and second gearboxes are mounted to the first and second electric motors respectively and wherein the first and second planetary gear sets are incorporated into the first and second gearboxes.

None of the references disclose this combination of features. Further, the examiner has admitted that the references do not disclose these features. The examiner argues that "the provision of a single enclosure to accommodate a plurality of related mechanical devices is not deemed to be beyond the skill of the ordinary practitioner, and as such, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the planetary gear sets, as well as the pinion and ring gear sets in a single enclosure, for the purpose of simplifying the drive train, and reducing manufacturing costs." Appellant disagrees.

There simply is no motivation or suggestion to modify Anglada '526 in the manner described by the examiner. A reference cannot be modified with teachings from the prior art absent some sort of beneficial result for the reference. Also, the primary reference cannot be modified if the modification adversely affects the benefits achieved by the reference.

The examiner is arguing that it is obvious to include all gear components in Anglada '526, plus an additional planetary gear set, into a single gear box enclosure that is mounted to the electric motors. To do so would clearly defeat the benefits achieved by Anglada '526. Anglada specifically provides multiple housing portions between the motor and the wheel so that desired movement between the various components can be achieved. Further, adding a gear box and planetary gear set would further increase the weight of the drive train and would adversely affect the counterbalance achieved in the various different embodiments in Anglada '526.

Thus, appellant asserts that the rejection of claim 25 under 35 U.S.C. 103(a) based on Anglada '526 as modified by Varela is improper and requests that the rejection be withdrawn.

Claim 27

Claim 27 recites that the first planetary gear set includes a first sun gear mounted for rotation with the first ring gear and the second planetary gear set includes a second sun gear mounted for rotation with the second ring gear.

None of the references disclose this configuration. Anglada discloses fixing a ring gear 21 directly to the wheel shaft 13. Varela discloses driving a sun gear 70 with an axle shaft 50 and driving a wheel output shaft 101 with the planet spider 100. There is no disclosure in either

reference of a sun gear being mounted for rotation with a ring gear from the first gear set in the manner set forth in the claims.

Thus, appellant asserts that the rejection of claim 27 under 35 U.S.C. 103(a) based on Anglada '526 as modified by Varela is improper and requests that the rejection be withdrawn.

Claim 38

Claim 38 recites that the first and second electric motors are supported by a common axle housing extending along the lateral axis of rotation. Anglada '526 does not disclose this feature.

It is clear from the drawings and description in Anglada '526, that the motors 15 are supported on separate housings that are movable relative to each other. "A rear axle casing 22 is bolted to each of the housings 12 and the two casings 22 are provided with laterally extending flanges 23 and these flanges are enclosed within a flange collar 24 in a manner to permit relative rotation of one housing with reference to the other." Page 1, line 103 through Page 2, line 1. See also Figure 1, which clearly shows multiple housing structures. Anglada '526 clearly does not teach supporting first and second motors with a common axle housing.

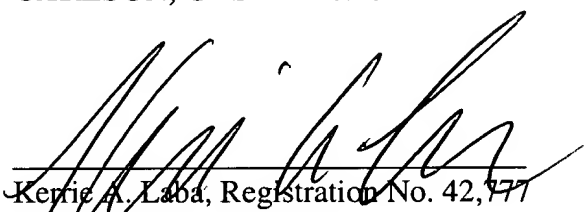
Thus, appellant asserts that the rejection of claim 38 under 35 U.S.C. 103(a) based on Anglada '526 as modified by Varela is improper and requests that the rejection be withdrawn.

CONCLUSION

For the reasons set forth above, the rejection of all claims is improper and should be reversed. Appellant earnestly requests such an action.

Respectfully submitted,

CARLSON, GASKEY & OLDS



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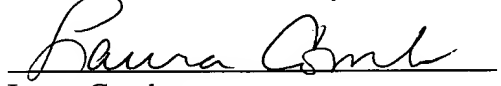
Dated: March 1, 2005

CERTIFICATE OF MAIL

I hereby certify that the enclosed Appeal Brief is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 1 day of March, 2005.



Laura Combs

CLAIMS APPENDIX

1-22. (Cancelled)

23. (Appealed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that intersects said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that intersects said lateral axis of rotation and is spaced apart from said first longitudinal axis of rotation; and

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation.

24. (Appealed) The assembly as set forth in Claim 23 wherein said first and second planetary gear sets are incorporated into said first and second wheel hubs.

25. (Appealed) The assembly as set forth in Claim 23, including a first gearbox for housing said first gear set and a second gearbox for housing said second gear set, said first and

second gearboxes being mounted to said first and second electric motors respectively and wherein said first and second planetary gear sets are incorporated into said first and second gearboxes.

26. (Appealed) The assembly as set forth in Claim 23, wherein said first gear set includes a first pinion gear in driving engagement with a first ring gear mounted for rotation with said first wheel hub and said second gear set includes a second pinion gear in driving engagement with a second ring gear mounted for rotation with said second wheel hub.

27. (Appealed) The assembly as set forth in Claim 26, wherein said first planetary gear set includes a first sun gear mounted for rotation with said first ring gear and a first plurality of planet gears in meshing engagement with a first planetary ring gear hub; and said second planetary gear set includes a second sun gear mounted for rotation with said second ring gear and a second plurality of planet gears in meshing engagement with a second planetary ring gear hub.

28. (Allowed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub wherein said first gear set includes a first pinion gear in driving engagement with a first ring gear mounted for rotation with said first wheel hub;

a second gear set for driving said second wheel hub wherein said second gear set includes a second pinion gear in driving engagement with a second ring gear mounted for rotation with said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation; and

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation wherein said first planetary gear set includes a first sun gear mounted for rotation with said first ring gear and a first plurality of planet gears in meshing engagement with a first planetary ring gear hub and wherein said second planetary gear set includes a second sun gear mounted for rotation with said second ring gear and a second plurality of planet gears in meshing engagement with a second planetary ring gear hub wherein said first planetary ring gear hub drives said first wheel hub and said second planetary ring gear hub drives said second wheel hub.

29. (Allowed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation; and

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation wherein said first planetary gear set includes a first sun gear mounted for rotation with said first ring gear and a first plurality of planet gears in meshing engagement with a first planetary ring gear hub and wherein said second planetary gear set includes a second sun gear mounted for rotation with said second ring gear and a second plurality of planet gears in meshing engagement with a second planetary ring gear hub wherein said first planetary ring gear hub drives said first driving axle shaft and said second planetary ring gear hub drives said second driving axle shaft.

30. (Allowed) The assembly as set forth in Claim 29, wherein said first planetary ring gear hub is integrally formed with said first driving axle shaft as one piece and said second planetary ring gear hub is integrally formed with said second driving axle shaft as one piece.

31. (Allowed) The assembly as set forth in Claim 30, wherein said first gear set and said first planetary gear set are housed within a first common gearbox mounted to said first electric motor, and said second gear set and said second planetary gear set are housed within a second common gearbox mounted to said second electric motor.

32. (Cancelled)

33. (Allowed) The assembly as set forth in Claim 41, wherein said first and said third electric motors extend radially from said first gear set, and said second and said fourth electric motors extend radially from said second gear set.

34. (Allowed) The assembly as set forth in Claim 33, wherein said first gear set includes a first pinion gear driven by said first electric motor and a second pinion gear driven by said third electric motor, said first and second pinion gears for simultaneously driving a first ring gear and wherein said second gear set includes a third pinion gear driven by said second electric motor and a fourth pinion gear driven by said fourth electric motor, said third and fourth pinion gears for simultaneously driving a second ring gear.

35. (Allowed) The assembly as set forth in Claim 34, wherein said first gear set is housed within a first gearbox mounted to said first and third electric motors and said second gear set is housed within a second gearbox mounted to said second and fourth electric motors.

36. (Appealed) The assembly as set forth in Claim 23, wherein said first and second longitudinal axes of rotation are perpendicular to said lateral axis of rotation.

37. (Allowed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation; and

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation wherein one of said first and second electric motors is mounted at a 90 degree angle extending generally horizontally and forwardly relative to said lateral axis of rotation and the other of said first and second electric motors is mounted at a 90 degree angle extending generally horizontally and rearwardly relative to said lateral axis of rotation.

38. (Appealed) The assembly as set forth in Claim 23, wherein said first and second electric motors are supported by a common axle housing extending along said lateral axis of rotation.

39. (Appealed) The assembly as set forth in Claim 23, wherein said first and second electric motors are mounted at a 90 degree angle extending generally vertically and upwardly from said lateral axis of rotation.

40. (Allowed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation; and

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation wherein said first and second electric motors are mounted at an angle extending generally horizontally and rearwardly from said lateral axis of rotation.

41. (Allowed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation;

a third electric motor in parallel driving relationship with said first electric motor to drive said first gear set; and

a fourth electric motor in parallel driving relationship with said second electric motor to drive said second gear set wherein said first and third electric motors drive said first gear set and said second and fourth electric motors drive said second gear set independently from each other.

42. (Cancelled)

43. (Allowed) The assembly as set forth in Claim 41, wherein said first gear set is housed within a first gearbox mounted to said first and third electric motors and said second gear set is housed within a second gearbox mounted to said second and fourth electric motors.

44. (Allowed) The assembly as set forth in Claim 43, wherein said first gear set includes a first pinion gear in driving engagement with a first ring gear mounted for rotation with said first wheel hub and said second gear set includes a second pinion gear in driving engagement with a second ring gear mounted for rotation with said second wheel hub.

45. (Allowed) The assembly as set forth in Claim 44, wherein said first planetary gear set includes a first sun gear mounted for rotation with said first ring gear and a first plurality of planet gears in meshing engagement with a first planetary ring gear hub and said second planetary gear set includes a second sun gear mounted for rotation with said second ring gear and a second plurality of planet gears in meshing engagement with a second planetary ring gear hub.

46. (Allowed) The assembly as set forth in Claim 41 wherein said third electric motor defines a third longitudinal axis of rotation that is co-linear with said first longitudinal axis of rotation and said fourth electric motor defines a fourth axis of rotation that is co-linear with said second longitudinal axis of rotation.

47. (Cancelled)

48. (Allowed) A vehicle comprising:

a vehicle body extending between lateral sides, passenger seats being mounted adjacent each of said lateral sides, a floor defined beneath said passenger seats, an aisle defined between said passenger seats, and said floor also extending beneath said aisle;

at least one driving axle for driving a pair of laterally spaced wheels including a first drive axle shaft associated with a first wheel of said pair of laterally spaced wheels, and a second drive axle shaft associated with a second wheel of said pair of laterally spaced wheels, said first and second drive axle shafts defining a lateral axis of rotation;

a first gear set and a second gear set for driving said first and second wheels;

a first planetary gear set and a second planetary gear set driven by said first and second gear sets about said lateral axis of rotation;

a first electric motor mounted at a non-parallel angle relative to said lateral axis of rotation for driving said first gear set, and a second electric motor mounted at a non-parallel angle relative to said lateral axis of rotation and operatively connected to drive said second gear set wherein said first and second electric motors drive said first and second planetary gear sets to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation; and

said first and second electric motors being mounted adjacent to said first and second wheels at a vertical position which is higher than a vertical position of the floor of said aisle.

49. (Allowed) The vehicle as set forth in Claim 48, including a third electric motor mounted in parallel driving relationship with said first electric motor to assist in driving said first gear set and a fourth electric motor mounted in parallel driving relationship with said second electric motor to assist in driving said second gear set.

50. (Allowed) The vehicle as set forth in Claim 49, wherein said first planetary gear set is driven by said first and third electric motors via said first gear set for speed reduction at said first wheel and said second planetary gear set is driven by said second and fourth electric motors via said second gear set for speed reduction at said second wheel.

51. (Allowed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation;

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation;

a first motor output shaft rotatable about said first longitudinal axis of rotation and a second motor output shaft rotatable about said second longitudinal axis of rotation;

said first gear set including a first pinion gear driven by said first motor output shaft and mounted for rotation about said first longitudinal axis of rotation and a first ring gear driven by said first pinion gear about said lateral axis of rotation;

said first planetary gear set including a first sun gear coupled for rotation with said first ring gear about said lateral axis of rotation;

said second gear set including a second pinion gear driven by said second motor output shaft and mounted for rotation about said second longitudinal axis of rotation and a second ring gear driven by said second pinion gear about said lateral axis of rotation; and

said second planetary gear set includes a second sun gear coupled for rotation with said second ring gear about said lateral axis of rotation.

52. (Allowed) The assembly as set forth in claim 51 wherein said first sun gear is directly coupled to said first ring gear and said second sun gear is directly coupled to said second ring gear.

53. (Allowed) The assembly as set forth in claim 51 wherein said first driving axle shaft is driven by said first ring gear and said first sun gear is driven by said first driving axle shaft and said second driving axle shaft is driven by said second ring gear and said second sun gear is driven by said second driving axle shaft.

54. (Allowed) The assembly as set forth in claim 51 wherein said first planetary gear set is positioned adjacent to said first motor output shaft and between said first ring gear and said first driving axle shaft and wherein said second planetary gear set is positioned adjacent to said second motor output shaft and between said second ring gear and said second driving axle shaft.

55. (Allowed) The assembly as set forth in claim 51 wherein said first planetary gear set is positioned adjacent to said first wheel hub at a distal end of said first driving axle shaft and said second planetary gear set is positioned adjacent to said second wheel hub at a distal end of said second driving axle shaft.

56. (Cancelled)

57. (Allowed) An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation;

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation;

a first motor output shaft rotatable about said first longitudinal axis of rotation and directly coupled to said first gear set; and

a second motor output shaft rotatable about said second longitudinal axis of rotation and directly coupled to said second gear set such that said first and second longitudinal axes of rotation intersect said lateral axis of rotation.

58. (Allowed) The vehicle as set forth in claim 48 including a first motor output shaft rotatable about a first longitudinal axis of rotation and directly coupled to said first gear set and a second motor output shaft rotatable about a second longitudinal axis of rotation and directly coupled to said second gear set such that said first and second longitudinal axes of rotation intersect said lateral axis of rotation.